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8-2019

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# Comparison of Ondansetron, Dexamethasone, and its Combination in the Prevention of Postoperative Nausea and Vomiting

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## Background

Postoperative nausea and vomiting remains a common and unpleasant side effect for patients following surgery. Uncontrolled PONV can result in prolonged hospital stays, unanticipated hospital readmissions, and decreased patient satisfaction. The Apfel score identifies and counts independent risk factors for PONV; females, non-smokers, postoperative opioid use, and history of PONV or motion sickness. Rates of PONV increases as the number of risk factors increase. The primary intervention to decrease PONV is administration of prophylactic antiemetics. Research supports the use of combination antiemetic therapy for patients with a high number of risk factors.

The purpose of this evidence based practice (EBP) project was to report the rate of PONV among surgical patients who received general anesthesia, comparing combination prophylactic antiemetics of ondansetron and dexamethasone to single antiemetic administration.

## Methods

- A retrospective, EBP project was conducted at Providence Sacred Heart Medical Center (PSHMC) in Spokane, WA.
- Permission was obtained by the facility and exemption determination was granted by the IRB.
- Patient data was securely extracted and stored in a HIPPA compliant REDCap database. Patient data was fully de-identified. Data extraction included all surgeries in the 2018 calendar year.
- Inclusion criteria: Adult patients  $\geq 18$  years old, non-emergent surgery, general anesthesia (ETT, LMA) using volatile inhalational agents or total intravenous anesthesia.
- Exclusion criteria: Pediatric, obstetric, emergency surgery, direct admission to ICU.
- PONV outcome determined by nursing documentation of PONV scale, intervention, reassessment or signs/symptoms or administration of antiemetic medication.
- Descriptive data analysis completed and stratified by the number of Apfel risk factors. Independent risk factors determined using binary logistic regression. Level of significance set at 0.05.

## Findings

Table 1: Baseline Demographic and Clinical Characteristics

	(N=12,193)	%
Apfel risk factors:		
Female gender	7,010	57%
Non-smoker	7,831	64%
Postoperative opioids	6,827	56%
History of PONV/motion sickness	1,772	15%
Gynecologic procedures	981	8%
Laparoscopic procedures	1,276	10%
Cholecystectomy procedures	219	2%
Anesthesia type:		
Inhalational agent	11,650	96%
Total intravenous anesthesia	543	4%
	Mean	SD
Age (years)	58	16
# Apfel risk factors	2	1
	Median	IQR
Duration of surgery (min)	102	64-152
Duration of nitrous oxide (min)	19	9-33

Table 2: Independent Risk Factors for PONV

Variable	OR	95% CI	P Value
Female gender	1.63	1.48-1.80	<0.001
Non-smoker	1.08	0.99-1.19	0.09
Postoperative opioids	1.80	1.63-1.98	<0.001
History of PONV/ motion sickness	1.32	1.17-1.49	<0.001
Age	0.93	0.90-0.95	<0.001
High risk procedures*	1.72	1.53-1.93	<0.001
Case duration	1.23	1.19-1.26	<0.001
Inhalational agent use	0.90	0.72-1.13	0.36
Nitrous oxide use	1.00	0.90-1.11	0.95
Antiemetic administered:			
Ondansetron	0.69	0.57-0.83	<0.001
Dexamethasone	0.69	0.53-0.88	0.003
Ondansetron & Dexamethasone	0.64	0.54-0.76	<0.001

\*High risk procedures include laparoscopic, gynecological, and cholecystectomy procedures

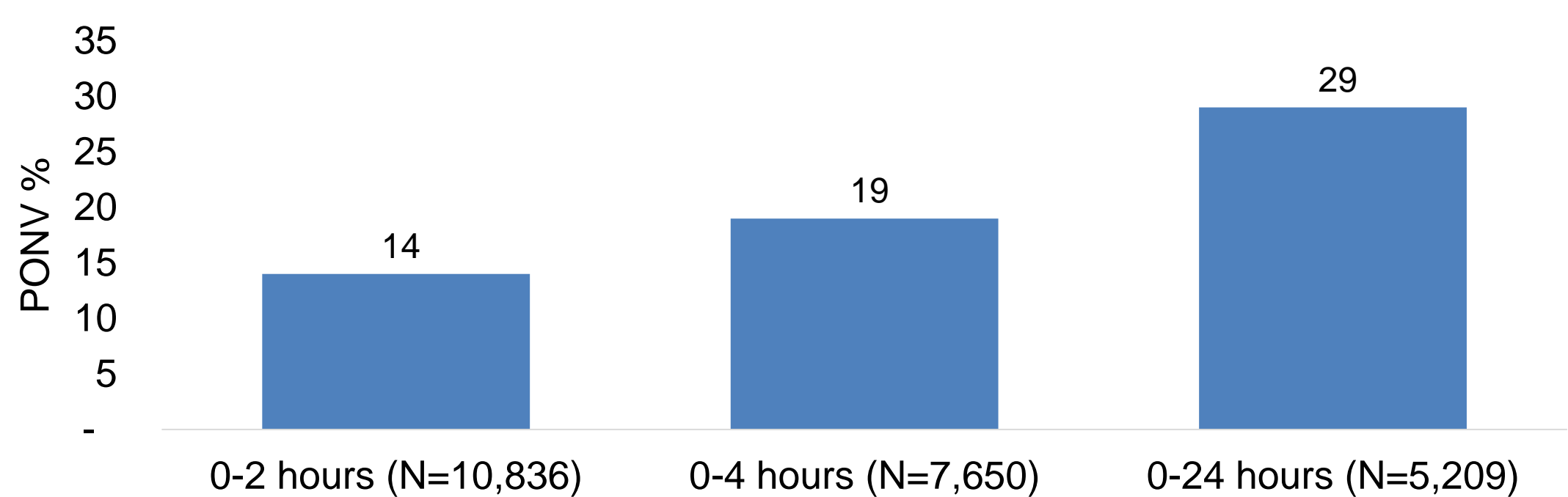
## Findings

Table 3: Incidence of PONV by Apfel Risk Factor

Overall 24 hr. PONV Rate (N=12,193)									
Intervention		PONV %							
Ondansetron		19							
Dexamethasone		22							
Ondansetron & Dexamethasone		23							
Intervention		PONV	No PONV	Total	Risk	RR	95% CI	P-value	
0 Apfel Risk Factors (N=834)	None (Predicted)	83	751	834	10%				
	Ondansetron	35	288	323	11%	1.09	0.75-1.58	0.65	
	Dexamethasone	5	55	60	8%	0.84	0.35-1.99	0.69	
	Ondansetron & Dexamethasone	46	405	451	10%	1.02	0.73-1.40	0.89	
Intervention		PONV	No PONV	Total	Risk	RR	95% CI	P-value	
1 Apfel Risk Factor (N=2,939)	None (Predicted)	617	2322	2939	21%				
	Ondansetron	140	818	958	15%	0.70	0.59-0.82	<0.0001	
	Dexamethasone	26	143	169	15%	0.73	0.51-1.05	0.09	
	Ondansetron & Dexamethasone	273	1539	1812	15%	0.72	0.63-0.82	<0.0001	
Intervention		PONV	No PONV	Total	Risk	RR	95% CI	P-value	
2 Apfel Risk Factors (N=4,055)	None (Predicted)	1581	2474	4055	39%				
	Ondansetron	197	728	925	21%	0.55	0.48-0.62	<0.0001	
	Dexamethasone	45	185	230	20%	0.50	0.38-0.65	<0.0001	
	Ondansetron & Dexamethasone	672	2228	2900	23%	0.59	0.55-0.64	<0.0001	
Intervention		PONV	No PONV	Total	Risk	RR	95% CI	P-value	
3 Apfel Risk Factors (N=2,738)	None (Predicted)	1670	1068	2738	61%				
	Ondansetron	117	304	421	28%	0.45	0.40-0.53	<0.0001	
	Dexamethasone	54	85	139	39%	0.64	0.52-0.79	<0.0001	
	Ondansetron & Dexamethasone	645	1533	2178	30%	0.48	0.45-0.52	<0.0001	
Intervention		PONV	No PONV	Total	Risk	RR	95% CI	P-value	
4 Apfel Risk Factors (N=674)	None (Predicted)	532	142	674	79%				
	Ondansetron	27	55	82	33%	0.42	0.31-0.57	<0.0001	
	Dexamethasone	6	19	25	24%	0.30	0.15-0.61	0.0008	
	Ondansetron & Dexamethasone	221	346	567	39%	0.49	0.44-0.55	<0.0001	

A significant result is a P-value <0.05

Figure 1: PONV by Time Period Followed



## Discussion

### CONCLUSION

When controlling for all literature reported PONV risk factors, this EBP project demonstrated that the odds of PONV reduction were similar for combination and individual antiemetic therapy. Similar to current research evidence, the identified independent risk factors for PONV were female gender, history of PONV or motion sickness, postoperative opioid administration, younger age, high risk procedures, and increased case duration. Non-smoking status and nitrous oxide use were not observed to be independent risk factors.

As Apfel reported, this project similarly reported an increase rate in PONV as the number of PONV risk factors increased. The observed risk of PONV decreased among patients with at least one Apfel risk factor following prophylactic antiemetic administration.

### IMPLICATIONS

Practice at PSHMC is demonstrating that combination prophylactic treatment is being used for patients with higher PONV risk factors. Practice is following current research evidence. Anesthetists should continue to tailor prophylactic antiemetic administration to patients based on presenting risk factors.

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